OLSEN, P.D., J. OLSEN AND N.J. MOONEY. 1982. Growth and development of nestling brown goshawks (*Accipiter fasciatus*), with details of breeding biology. *Emu* 82: 189–194.

PICOZZI, N. 1980. Food, growth, survival and sex ratio of nestling hen harriers *Circus c. cyaneus* in Orkney. *Ornis Scand.* 11:1–11.

POOLE, K.G. 1989. Determining age and sex of nestling gyrfalcons. *J. Raptor Res.* 23:45–47.

ROCAMORA, G. 1994. Bonelli's eagle *Hieraaetus fasciatus*. Pages 184–185 *in* G.M. Tucker and M.F. Heath [EDS.], Birds in Europe, their conservation status. Birdlife International, Birdlife Cons., Ser. 3, Cambridge, U.K.

SOKAL, R.R. AND F.J. ROHLF. 1969. Biometry. Freeman, San Francisco, CA U.S.A.

SODHI, N.S. 1992. Growth of nestling merlins, *Falco columbarius*. *Can. Field-Nat.* 106:387–389.

SPSS-INC. 1990. SPSS reference guide. SPSS Inc., Chicago, IL U.S.A.

TORRES, J.A., P. JORDANO AND A. LEÓN. 1981. Aves de Presa Diurnas en la Provincia de Córdoba. Publicaciones del Monte de Piedad y Caja de Ahorros de Córdoba. Córdoba, Spain.

VEIGA, J.P. AND F. HIRALDO. 1990. Food habits and the survival and growth of nestling of two sympatric kites (*Milvus milvus* and *Milvus migrans*). *Holarct. Ecol.* 13:62–71.

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AUTUMN MIGRATION OF HONEY BUZZARDS IN SOUTHERN ITALY

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KEY WORDS: *honey buzzard*; *migration*; *orientation*; Pernis apivorus.

To date, counts of honey buzzards (*Pernis apivorus*) migrating in autumn over the central Mediterranean have been done only on the island of Malta, where hundreds of individuals have been observed (Beaman and Galea 1974). The peak of autumn migration for this species over the Straits of Gibraltar and the Bosphorus was during the first half of September (Bernis 1973, Cramp and Simmons 1980, Porter and Beaman 1985). Autumn migration over Malta is later, from mid- to the end of September.

The aim of our study was to contribute to the knowledge on the autumn migration of this species in this area of the Mediterranean.

STUDY AREA AND METHODS

Observations were carried out from 24 August to 5 October 1993. Our observation post was on the slopes of Mount Covello at an altitude of approximately 700 m where the distance between the Tyrrhenian and Jonian coasts is narrowest (30 km; Fig. 1). The valley of the River Pesipe separates Mount Covello from Mount Contessa in the west. In this area the Apennines are interrupted by a flat and hilly zone between the two reliefs and the Sila plateau to the north and the Tyrrhenian and the Jonian coasts to the west and the east. Observations were made using 10 × 50 binoculars.

RESULTS AND DISCUSSION

We observed 895 honey buzzards in 326.5 hr of observation. The migration showed two periods of movement, the first containing the major concentrations of individuals, occurred from 31 August to 1 September, and the second occurred from 16–19 September (Fig. 2). Our data contrasted with a previous study in Malta, where the peak of the autumn migration over the central Mediterranean occurred after the first half of September (Beaman and Galea 1974). Our results agree instead with observations made at the Straits of Gibraltar (Bernis 1973) and the Bosphorus (Porter and Beaman 1985).

We found temporal separation between the seasonal passage of adults and juveniles. In 218 cases the honey buzzards were very close (<100 m) overhead and it was possible to observe their plumage; from 24 August to 12 September, 147 (89.6%) were adults and 17 (10.4%) juveniles, while from 13 September to 5 October, 52 (96.3%) were juveniles and only two (3.7%) adults. This means that juvenile honey buzzards migrated later than the adults.

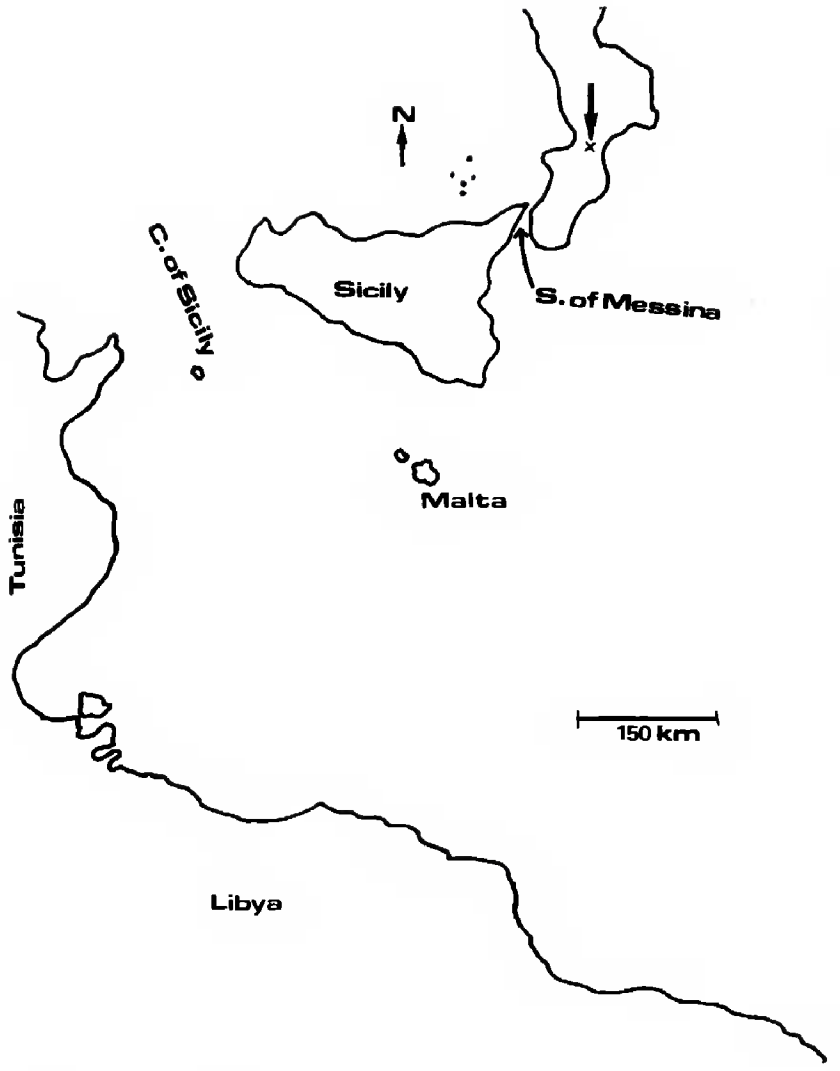

Figure 1. Study area location.

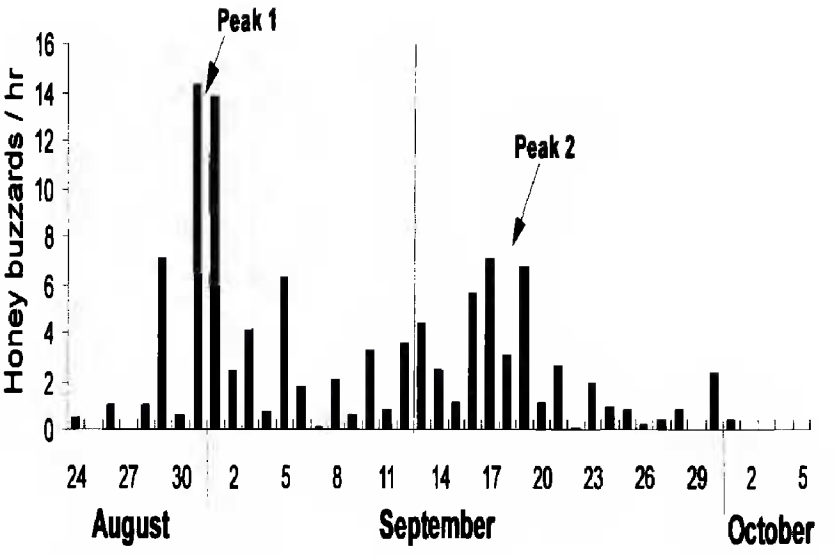

Figure 2. Seasonal occurrence of migrating honey buzzards on the Calabrian Apennines in summer and autumn 1993.

Therefore the bimodal distribution of honey buzzard migration may be due to the passage of individuals of the two age classes. Given the late peak in migration in Malta, these results suggest that only the juveniles concentrate during autumn over that island. Observations made in Malta during autumn 1994 seem to support this hypothesis; in 47 cases it has been possible to observe the plumage of the birds: 42 (89.4%) were juveniles and only five (10.6%) adults (Patrick and Mangion pers. comm.).

During spring migration honey buzzards crossed the central Mediterranean mainly between Tunisia and Sicily, where the sea is narrowest (150 km; Fig. 1), while few individuals were observed in Malta (Sultana and Gauci 1982, Agostini et al. 1994b). We suggest that adults may also use the first migratory route during the autumn migration, thereby avoiding a longer sea crossing. Studies of Eurasian sparrowhawks (*Accipiter nisus*) in central Europe during autumn migration have shown that the adults, after being captured and transported over 600 km to the east, flew more toward the west. Immature individuals tended to move along a northeast to southwest axis. These results suggest that immature sparrowhawks possess a genetically defined axis of migration along which they orient during their first migration (Drost 1938 quoted by Kerlinger 1989). A similar difference between the two age classes in honey buzzards would confirm our hypothesis, since the migratory route which crosses the central Mediterranean over the island of Malta is the result orientation by raptors in a southwestern direction.

The enormous difference between the counts made on the Straits of Messina during spring (Agostini 1992, Agostini et al. 1994a) and those made from Mount Covello, suggests that only a small part of the population of this species crosses the central Mediterranean during autumn migration. There is a large overlap in the breeding areas of populations of honey buzzards that cross the Channel of Sicily and of populations that cross the Straits of Gibraltar (in Sweden and central Europe) and the Bosphorus (in Finland; Cramp and Simmons 1980, Gensbol 1992). Perhaps most individuals seen on the Calabrian Apennines belong to the breeding population of central Italy; the geographical characteristic of the peninsula suggests that for these birds the central Mediterranean is an obligatory route.

RESUMEN.—Se hicieron observaciones sobre la migración de otoño de *Pernis apivorus* en el Mediterráneo central, desde el 24 de agosto hasta el cinco de octubre de 1993. Los registros se realizaron en un puesto de observación localizado en Mount Covello, en los Calabrian Apennines (al sur de Italia). Se observaron 895 individuos, con la mayor concentración de individuos entre el 31 de agosto y el 1 de septiembre. Los adultos migraron más temprano que los juveniles. Nuestras observaciones sugieren que solamente los juveniles concentran su migración otoñal sobre la Isla de Malta.

[Traducción de Ivan Lazo]

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LITERATURE CITED

AGOSTINI, N. 1992. Spring migration of honey buzzards (*Pernis apivorus*) at the Straits of Messina in relation to atmospheric conditions. *J. Raptor Res.* 26:93–96.

———, G. MALARA, F. NERI AND D. MOLLICONE. 1994a. Spring migration of honey buzzards (*Pernis apivorus*) at the Straits of Messina: problems concerning protection. *Riv. Ital. Ornitol.* 63:187–192.

———, ———, ———, ——— AND S. MELOTTO. 1994b. Flight strategies of honey buzzards during spring migration across the central Mediterranean. *Avocetta* 18:73–76.

BEAMAN, M. AND C. GALEA. 1974. The visible migration of raptors over the Maltese Islands. *Ibis* 116:419–431.

BERNIS, F. 1973. Migracion de Falconiformes y Ciconia spp. por Gibraltar, verano otono 1972–1973: Primera parte. *Ardeola* 19:152–224.

CRAMP, S. AND K.E.L. SIMMONS. 1980. The birds of the western palearctic. Vol. II. Oxford Univ. Press, Oxford, U.K.

DROST, R. 1938. Uber den Einfluss von Verfrachtungen zur Herbstzugzeit auf den Sperber *Accipiter nisus* (L.). Proc. Int. Ornithol. Congr. 9:502–521.

GENSBOL, B. 1992. Guida ai rapaci diurni. Zanichelli Editore, Bologna, Italy.

KERLINGER, P. 1989. Flight strategies of migrating hawks. Univ. Chicago Press, Chicago, IL U.S.A.

PORTER, R.F. AND M.A.S. BEAMAN. 1985. A resumé of raptor migration in Europe and the Middle East. Pages 237–242 *in* I. Newton and R.D. Chancellor [EDS.], Conservation studies on raptors. International Council for Bird Preservation Tech. Publ. No. 5. Cambridge, U.K.

SULTANA, J. AND C. GAUCI. 1982. A new guide to the birds of Malta. Ornithol. Soc., Valletta, Malta.

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NOTES ON THE WINTER ROOST AND DIET OF LONG-EARED OWLS IN THE SONORAN DESERT

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KEY WORDS: *Arizona*; Asio otus; *diet*; *long-eared owl*; *Sonoran Desert.*

The winter diet of long-eared owls (*Asio otus*) in North America has been well-documented (see Marti 1976, Cramp 1985 for reviews). However, there are few records of the diet of this species in the arid Southwest (Stophlet 1959, Marti et al. 1986, Barrows 1989). Although localized populations of long-eared owls inhabit the Sonoran Desert in Arizona (Phillips et al. 1964), only one report of the diet of long-eared owls exists from the Sonoran Desert in southwestern California (Barrows 1989). In this paper, I describe the roost and diet of wintering long-eared owls in the Sonoran Desert in Arizona.

STUDY AREA AND METHODS

The winter roost was located in a cluster of ironwood trees (*Olneya tesota*) in a wash 1.2 km north of Deadman Gap, on the eastern edge of the Crater Mountain Range. The vegetation on the valley floor around Deadman Gap is dominated by creosote (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*), and lacks larger tree-like vegetation or cacti. However, thickets of ironwood, palo verde (*Cercidium* sp.), and mesquite (*Prosopis* sp.) can be found in the washes that traverse the area. The rocky slopes of the Crater Range contain creosote and bursage scattered among a sparse mixture of palo verde, ironwood, and saguaro (*Cereus giganteus*).

Pellets were collected from beneath the roost from 4 March to 30 March 1994, when long-eared owls were observed in the area. Most of the pellets were soaked in a weak NaOH solution and sieved through a wire screen (Marti 1987). The remaining pellets were analyzed by dry dissection. The mammalian skulls and dentaries were identified with the use of keys (Hoffmeister 1986, Jones and Manning 1992), and the number of each species was determined by the number of skulls with the exception of the bird and scorpion remains.

RESULTS

Roost Description. Approximately a dozen owls were seen roosting on the lower branches of the ironwood trees which were situated on the bank of a 25-m-wide dry wash. The morphology of the ironwood trees was such that the foliage was more dense and widespread near the base than